# Resource Guide to the Arkansas Curriculum Framework for Students with Disabilities for Tenth Grade Science

Summer 2007 Amended 2009

## **Purpose and Process**

The Individuals with Disabilities Education Act and No Child Left Behind mandate that schools provide access to the general education curriculum for all students receiving special education services. In recognizing the challenge of providing opportunities for students with disabilities to access general education curriculum, it is the desire of the Arkansas Department of Education to assist educators with this process. The goal is to assist school personnel who serve children with disabilities in conceptualizing, planning, and implementing activities that are aligned to the Arkansas Curriculum Framework.

The following document contains ideas for linking activities to the same science framework used for the general education curriculum. When selecting appropriate activities, decisions must be based on individual student needs and abilities. Collaboration with science personnel will provide assistance in linking science curriculum with the State framework. The Arkansas Alternate Portfolio Assessment must align to the Arkansas Curriculum Framework. Specifically, the Tenth Grade Science Portfolio Assessment for Students with Disabilities must align with the same Biology content standards upon which other tenth grade students are assessed. The Tenth Grade Science Portfolio Assessment must contain one entry from each of the nine content standards that are embedded in the four strands for Biology listed below.

### Science Curriculum Framework

### **Biology Strands:**

- Molecules and Cells (3 content standards)
- Heredity and Evolution (3 content standards)
- Classification and the Diversity of Life (1 content standard)
- Ecology and Behavioral Relationships (2 content standards)

In May 2007, the Arkansas Department of Education convened a task force of general education science teachers, teachers of students with disabilities, and administrators to collaborate and develop the following resource guide to be used to help with the process of developing a tenth grade science portfolio assessment for students with disabilities not accessing Biology or any equivalent course.

The committee identified which student learning expectations (SLEs) from the Arkansas Biology Science Curriculum Framework would be appropriate to include in this resource guide. Each SLE was evaluated by the committee to determine the essence of learning. Using the essence of the SLE, different levels of complexity of learning were written and organized within a matrix from least complex to most complex. This allows students to have access to the same content standards. Ideas for corresponding sample activities were also included. Each individual student's abilities must first be considered when selecting ideas from this guide. Augmentative communication equipment and/or other adaptations should be used to make accommodations for students who require them to meet the SLE. Teachers will need to use creativity in adapting the suggested activities to meet students' individual needs.

Although this publication is not intended for generating specific test item activities for the Arkansas Alternate Portfolio System for Students with Disabilities, its purpose is to provide Arkansas educators with a process for determining alignment between models of education that have been to some extent separate. Using the activities as idea starters, the educators can then individualize and develop specific activities that align with the education program, demonstrate performance of skills, and document educational opportunities. The members of the committee do not intend this publication to be used as a checklist, a menu of alternate assessment "test activities or items," or as Individualized Education Plan (IEP) goals and objectives. The resources listed in this document are meant to give teachers some ideas of ways to access materials for teaching science to students with disabilities. This is not an exhaustive list and Web sites may change over time.

### **COMMITTEE MEMBERS**

Science Educators	Special Educators
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# **Biology**

Strand	Content Standard
Molecules and Cells	
	1. Students shall demonstrate an understanding of the role of chemistry in life processes.
	2. Students shall demonstrate an understanding of the structure and function of cells.
	3. Students shall demonstrate an understanding of how cells obtain and use energy (energetics).
Heredity and Evolution	
	4. Students shall demonstrate an understanding of <i>heredity</i> .
	5. Students shall investigate the molecular basis of genetics.
	6. Students shall examine the development of the theory of biological evolution.
Classification and the Divers	sity of Life
	7. Students shall demonstrate an understanding that organisms are diverse.
Ecology and Behavioral Rela	ationships
	8. Students shall demonstrate an understanding of ecological and behavioral relationships
	among organisms.
	9. Students shall demonstrate an understanding of the ecological impact of global issues.

<sup>\*</sup> changes made due to alignment study requested by USDOE in January 2009

Molecules and Cells	Students sha	andard 1: all demonstrate an ι	understanding of the	role of chemistry in	n life processes.	
MC.1.B.1 Describe the structure and function of the major organic molecules found in living systems:  • carbohydrates  • proteins  • enzymes  • lipids	Essence of Student Learning Expectation	Less Complex			More Complex	
	*Describe the structure and function of organic molecules in living things	Group foods as starches (carbohydrates), fats (lipids), and proteins	*Compare examples of carbohydrates, lipids, and proteins to their functions	*Apply knowledge of organic molecules (carbohydrate, lipid, protein) to foods	*Describe the structure of organic molecules (carbohydrate, lipid, protein) and their functions	
nucleic acids  Resources: United Streaming		*Example: Use pictures or actual food to sort and classify foods by primary nutrient (e.g., bread is a carbohydrate, chicken is a protein)	*Example: Using two identical sets of pictures of various foods, create two posters; on the first poster, group the foods as carbohydrates, lipids, or proteins; on the second poster, group the same foods by function: stored energy (lipids), quick energy (carbs), proteins (build muscle); compare the type of food to its function	*Example: Record a food diary; identify the organic compounds found in the foods eaten (some foods may contain more than one group); Relate foods to functions in the body (e.g., chart with words or pictures)  see Appendix	*Example: Create chart comparing elements found in carbohydrates, lipids, and proteins see Appendix	

Molecules and Cells	Students sha	andard 1: all demonstrate an เ	understanding of the	e role of chemistry	n life processes.	
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex			More Complex	
MC.1.B.3 Investigate the properties and importance of water and its significance for life:	*Investigate why the properties of water are important to life	Determine the effects of water on living things	*Investigate the properties of water and relate to a function in living things	*Investigate the properties of water and relate to a function in living things	*Research the effects of water deprivation on living things	
<ul><li>polarity</li><li>pH</li></ul>		Example: Using two (2) plants, water one plant, do not water the other; record observations of both plants	*Example: Conduct penny activity demonstrating surface tension and cohesion of water  See Appendix	*Example: Conduct celery activity demonstrating adhesion and cohesion  See Appendix	*Example: Respond to one or more writing prompts (e.g., investigate the effects of prolonged dehydration on the human body)	

Molecules and Cells	Students sha		understanding of the	e role of chemistry i	n life processes.	
MC.1.B.4 Explain the role of energy in chemical reactions of living systems:  • activation energy • exergonic reactions • endergonic reactions	Essence of Student Learning Expectation	Less Complex			More Complex	
	Describe how energy can be taken in or given off in living systems	Identify food as a source of chemical energy for animals and humans	Recognize that food contains chemical energy which is measured in calories	Compare the number of calories in several foods to the number of calories burned during common activities	Demonstrate how food has energy to produce heat	
		Example: Match pictures of food to pictures of appropriate animals (e.g., grass-cow, lion-antelope)	Example: Collect nutrition labels from a variety of foods; group labels from least energy to most energy (calories)	Example: Create a poster or other visual comparing calories in foods to amount of exercise needed to "burn" those calories	Example: Burn potato chips or peanuts in a soda can oven and describe what is happening with the energy	
		Resources: AGFC	Resources: Energy	Resources: Energy	Resources: Scientific American website, Diagram	

Molecules and Cells		Content Standard 2:					
Student Learning Expectation  MC.2.B.1 Construct a hierarchy of life from cells to ecosystems	Essence of Student Learning Expectation	all demonstrate an understanding of the structure and func Less Complex			More Complex		
	Depict the progression of life from cells to	Sequence the progression of life	Demonstrate the progression of life	Illustrate progression from cell to ecosystem	Model an ecosystem		
	ecosystems	Example: Sequence pictures	Example: Create a picture book/flip book; use clear transparencies to layer the progression of life: 1st sheet-cell 2nd sheet-tissue 3rd sheet-organ 4th sheet-organ system 5th sheet-body	Example: Make a graphic map (picture line) that shows progression from cell to ecosystem to include any or all of the following: cell, tissue, organ, system, organism, population, community, ecosystem	Example: Construct a diorama of an ecosystem and label the various levels		
Resources: United Streaming					Resources: Ecology		

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.					
MC.2.B.2 Compare and contrast prokaryotes and eukaryotes	Essence of Student Learning Expectation	Less Complex			More Complex	
	Compare Recognize	Recognize cells with and without a nucleus	Identify cells with and without a nucleus	Develop and identify models of a cell with and without a nucleus	Compare cells with and without a nucleus	
		Example: Place hair gel in two (2) sandwich bags; place a marble in one bag; student recognizes one bag represents a cell without a nucleus and one bag represents a cell	Example: Take two (2) half cored oranges and fill each with gelatin adding a grape to one; student identifies which represents a cell with or without a nucleus	Example: Use various colors of modeling clay, create and label cell models with and without a nucleus	Example: Observe cells using a microscope or internet Web site and record results on lab sheet	
		with a nucleus			Resources: Cells Alive Web site	

Molecules and Cells	Content Sta		inderstanding of the	structure and func	tion of calls	
MC.2.B.4 Relate the function of the plasma (cell) membrane to its structure	Essence of Student Learning Expectation	Less Complex			More Complex	
	*Demonstrate the role of the cell membrane	*Demonstrate that the cell membrane allows certain materials to pass in and out of the cell	Demonstrate the function of the cell membrane by using common materials	Illustrate the role of the cell membrane	*Demonstrate the movement of material across the cell membrane	
		Example: Use a mesh laundry bag to demonstrate a cell membranemesh bag allows water and detergent in and keeps other clothes in the washing machine out; boil-in-bag rice that allows water to enter, but keeps rice inside	Examples: Common materials may include fish net, colander, slotted spoon, sifter, window screen	Examples: Make tea or coffee to demonstrate how the granules stay in the bag and the water penetrates, then describe how this process compares to a cell membrane	Examples: Using dialysis tubing filled with glucose/starch, tie the tubing and place in water for one hour or more; test the water for simple sugar by dropping Benedict solution/iodine in the water; if the water changes color, it is a positive for sugar/starch  Resources: Lab Descriptions	
Resources: Cells; United Streaming						

Molecules and Cells	Content Standard 2:					
Student Learning Expectation  MC.2.B.5 Compare and contrast the structures of an animal cell to a plant cell	Essence of Student Learning Expectation	Less Complex			More Complex	
	*Demonstrate differences between animal and plant cells	*Demonstrate common structures found in both plant and animal cells (cell membrane, cytoplasm, nucleus)	*Create plant and animal cell models	Compare and contrast plant and animal cells	Analyze the differences between plant and animal cells	
		*Example: Using a picture of an animal cell and a picture of a plant cell, identify structures the cells have in common	*Examples: Craft foam, edible cell models, colored felt  (plant cell model should include chloroplast, cell wall, and large vacuole)	Examples: Create a Venn diagram using gallon bags divided into three (3) sections, placing like items in the center section and different items in the outer sections; create a paper Venn diagram	*Examples: Observe cells through a microscope and record findings on a lab sheet (plant cell - elodea and animal cell -cheek); draw both a plant and animal cell and label cell structures on both; create a T-	
Resources: Cells				See Appendix	chart to compare cell structures; observe plant and animal cells (e.g., video, pictures) and complete observation chart  See Appendix	

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.					
MC.2.B.6 Compare and contrast the functions of autotrophs and heterotrophs	Essence of Student Less Complex Learning Expectation				More Complex	
	Compare and contrast what producers and consumers do in an	Identify producers and consumers	Determine consumers and producers in a system	Classify consumers and producers in an ecosystem	Create and label examples of interactions between producers and consumers	
	ecosystem	Example: Create a visual by grouping pictures of organisms that use energy from the sun (producers) and organisms that get energy directly from plants or animals (consumers)	Example: Create a balanced classroom terrarium identifying both consumers and producers	Example: Take photos of organisms in the environment (e.g., flowers and bees) then use the photos to create a page/poster about of consumers and a page/poster about producers	Example: Create a biome in a box or a diorama that shows labeled consumers and producers in action (e.g., deer eating grass)	
Resources: Ecology						

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.					
MC.2.B.11 Discuss homeostasis using thermoregulation as an example	Essence of Student Learning Expectation	Less Comple	x		More Complex	
	*Demonstrate how organisms maintain body temperature	*Demonstrate the importance of organisms maintaining their temperature	*Compare body temperatures	*Demonstrate how physical activity affects the regulation of body temperature	*Research methods that birds and mammals use to regulate their body temperature (e.g., blubber, thick fur, fluffing feathers, panting)	
		*Example: Take and record the temperature of every student in the room over a period of time and chart the results to demonstrate regulation of body temperature	*Example: Take and record the temperature of every student in the room over a period of time and graph the results, then discuss the results in relation to maintenance of body temperature	*Example: Take student's temperature before and after physical activity (e.g., physical therapy and/or occupational therapy, walking to and from lunch, regular or adaptive physical education class) and use the data to create a chart comparing the before and after temperatures, then discuss the results	*Examples: Write a report; create a poster or slide presentation	

Molecules and Cells  Student Learning Expectation  MC.3.B.1 Compare and contrast the structure and function of mitochondria and chloroplasts	Content Standard 3: Students shall demonstrate an understanding of how cells obtain and use energy (energetics).					
	Essence of Student Learning Expectation  Student Less Complex				More Complex	
	*Demonstrate how animal cells and plant cells get their energy	*Compare plant and animal cell structures that function in energy conversion	*Model the structure of chloroplasts and mitochondria in cells	*Compare and contrast the structure and function of mitochondria and chloroplasts	*Describe the relationship between mitochondria and chloroplasts in the functions of photosynthesis and cellular respiration	
		*Example: Label chloroplasts and mitochondria on diagrams of animal and plant cells (mitochondria are located in both animals and plants, chloroplasts are located in plants only)	*Example: Create a simplified model of a plant cell highlighting chloroplasts and mitochondria and a simplified model of an animal cell highlighting mitochondria	*Examples: Create a Venn diagram or T-chart; write a paragraph	*Examples: Create a flowchart or diagram; write a paragraph; experiment with oxygen production using Elodea and snail  Resources: Cells  See Appendix	
Resources: United Streaming, Cells					2237.460	

Molecules and Cells	Content Standard 3: Students shall demonstrate an understanding of how cells obtain and use energy (energetics).					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	x		More Complex	
MC.3.B.3 Compare and contrast aerobic and anaerobic respiration:  • lactic acid fermentation • alcoholic fermentation	*Demonstrate cellular respiration with and without the use of oxygen	*Observe anaerobic (without oxygen) and aerobic (with oxygen) cellular respiration (mitochondria of plants and animals)  *Examples: Shake milk and lemon juice together in a jar demonstrating lactic acid fermentation; complete a T-chart comparing fermentation to cellular respiration; bake Amish bread or fruitcake	*Demonstrate the results of alcoholic fermentation (yeast) and cellular respiration (mitochondria of plants and animals)  *Example: Sample experiment: Ingredients • 125 ml of warm water • 60 ml of sugar • soda bottle • package of yeast • balloon that fits neck of soda bottle Combine sugar and water in the bottle, shake to mix, add yeast, quickly place a balloon over the neck of the bottle and agitate bottle for a few seconds, record results; compare results to cellular respiration in	*Record practical applications of aerobic and anaerobic respiration (e.g., making cheese or yogurt; sewage treatment, athletic endurance)  *Examples: Watch video on how cheese is made and complete a listening sheet; contact American Dairy Council for information which can be used to create a student project	*Compare and contrast lactic acid fermentation, alcoholic fermentation and cellular respiration  *Example: Create and label a poster with examples of cellular respiration, lactic acid fermentation, and alcoholic fermentation	
Resources: Lab Descriptions		Resources: Recipe	animals and plants Resources: Lab Descriptions	Resources: United Streaming	Resources: Lab Descriptions	

Molecules and Cells	Content Standard 3: Students shall demonstrate an understanding of how cells obtain and use energy (energetics).						
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	2X		More Complex		
MC.3.B.5 Compare and contrast cellular respiration and photosynthesis as energy conversion pathways	*Demonstrate how organisms produce and transfer energy	Recognize that photosynthesis stores energy and cellular respiration releases energy for cell use	Determine the outcome of energy conversion in respiration and photosynthesis  *Example:	Interpret the results of cellular respiration  *Example:	Compare cellular respiration and photosynthesis  Examples:		
		Example: Create visual comparing photosynthesis and cellular respiration  See Appendix	Sample experiment:  • place clear plastic bag over plant  • place plant in sunlight  • observe water collection in bag over 2-3 days  • chart results  (water is a byproduct of cellular respiration)	Sample experiment:  obtain seeds and soak overnight  place potting soil in container with clear lid  plant seeds in soil and cover with clear lid  observe for several days and record the results  (water should collect on the bottom surface of the lid)	Construct a Venn diagram; create a poster or slide presentation		
			Resources: Lab Descriptions	Resources: Lab Descriptions	Resources: United Streaming		

Heredity and Evolution	Content Sta	ndard 4:					
,	Students sha	ents shall demonstrate an understanding of <i>heredity</i> .					
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex	More Complex				
HE.4.B.1 Summarize the outcomes of Gregor Mendel's experimental procedures	*Compare dominant and recessive traits	Identify traits of plants and animals given real examples or photographs	Sort plants or animals based on dominant and recessive traits given real examples or photographs	Distinguish traits as dominant or recessive	*Explain how offspring acquire dominant and recessive traits (e.g., guinea pigs, pea plants)		
Resources: Genetics, United		*Example: Identify traits, such as height, hair color, eye color, flower color	Examples: Sort by tall/short, dark hair/light hair, dark eyes/light eyes	*Examples: Give specific examples of dominant and recessive traits using pictures, charts, or case studies of various	*Example: Create imaginary animal with dominant and recessive traits (Reebops activity)  Resources:		
Streaming		Resources: Animals and Plants		traits	Genetics		
HE.4.B.3 Use the <i>laws</i> of probability and <i>Punnett squares</i> to predict <i>genotypic</i> and <i>phenotypic ratios</i>	Predict appearance of organisms based on inherited genes	Identify inherited traits	Predict the appearance of offspring based on observation of parents	Predict appearance of offspring using manipulatives with a pre-constructed Punnett square	Complete a Punnett square to predict the appearance of offspring		
		Example: Match offspring to parents using picture cards of living things (e.g., chick to chicken, puppy to dog)	Example: Use picture cards depicting various traits such as height, hair color, eye color, flower color	Example: Use colored candy or checkers  B b	Example:  B b		
Resources: Genetics, United Streaming							

Heredity and Evolution	Content Sta					
_	Students shall demonstrate an understanding of <i>heredity</i> .					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	x		More Complex	
HE.4.B.5 Analyze the historically significant work of prominent geneticists	*Recognize major genetic discoveries that have had an impact on society	*Recognize major genetic discoveries and their impact on society  *Example: Create a collage depicting genetic discoveries (e.g., DNA structure, Human Genome Project, genetically modified foods)	*Recognize that major discoveries in genetics have occurred over time  *Example: Create a timeline of major genetic discoveries (e.g., Mendel, Watson and Crick, Human Genome Project)	Research a major discovery in genetics and its impact on society  *Examples: Write a report; create a poster	*Create a multi- media presentation outlining the genetic discovery of one major geneticist including the impact on society	
Resources: Genetics, United Streaming		Resources:	Resources:	Resources:	Resources:	
		Genetics	Genetics	Genetics	Genetics	

Heredity and Evolution	Content Standard 5: Students shall investigate the molecular basis of genetics.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	<u> </u>	incucs.	More Complex	
HE.5.B.3 Compare and contrast the structure and function of <i>DNA</i> and <i>RNA</i>	Identify the differences between DNA and RNA	Recognize DNA (double strand) and RNA (single strand) models	Distinguish between the appearances of DNA and RNA	Depict or illustrate the appearances of DNA and RNA	Make 3-D models of DNA and RNA and identify their functions	
Resources: Genetics, United Streaming		Examples: Models made of licorice candy, pull and peel candy, yarn, string cheese	Examples: Sort materials by appearance such as a zipper, string, string cheese, fabric hook and loop fasteners, pull and peel candy	Example: Label or assemble a model of DNA and RNA  Resource: Genetics	Examples: Design a puzzle; create model from marshmallows and toothpicks	
HE.5.B.4 Describe and model the processes of replication, transcription, and translation	Model DNA replication	Model DNA replication through physical movement	*Model replication of DNA by using common items	Model replication of DNA by repeating a pattern to create a two-dimensional model	*Assemble a 3-D model of DNA replication using a prepared model or puzzle	
		Example: Compare processes from daily routine, such as imitation of motor movements (cross-lateral movement) or calisthenics, to the process of DNA replication	*Example: Make copies using carbon paper or fabric hook and loop fasteners and compare that to the process of DNA replication	*Example: Using objects with four different colors and/or shapes, create two strands representing a DNA molecule, separate the two strands and use each strand to make a new strand (the result will be	Example: Use index cards to make puzzle pieces  Resources:	
Resources: Genetics, United Streaming				two double-stranded DNA models)	Genetics	

Heredity and Evolution	Content Standard 5: Students shall investigate the molecular basis of genetics.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex			More Complex	
HE.5.B.6 Identify effects of changes brought about by mutations:  • beneficial	Identify the effects of changes in DNA	Recognize that mutations are changes in DNA	Identify harmful or beneficial changes	Distinguish among mutations in living things as beneficial, harmful, or neutral	Research a genetic disorder caused by a mutation	
<ul> <li>harmful</li> <li>neutral</li> </ul>		Example: Using a DNA model (e.g., colored paper, colored candies or marshmallows) remove or change a section to represent a mutation; take before and after pictures	Example: Group examples of changes caused by mutations as either beneficial (e.g., animal or plant camouflage, larger fruit or flowers in plants) or harmful (e.g., sickle-cell anemia, cystic fibrosis, antibiotic resistant bacteria)	Example: Create a visual (e.g., poster, slide show) comparing effects of harmful mutations (e.g., sickle-cell anemia, cystic fibrosis, antibiotic resistant bacteria) and beneficial mutations (e.g., animal or plant camouflage, larger fruit or flowers in	Examples: Write a report; create a poster or slide show presentation	
Resources: Genetics, United Streaming			Note: Resistance to antibiotics is helpful to bacteria, but harmful to humans.	plants)		

Heredity and Evolution	Content Sta					
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex			More Complex	
HE.6.B.1 Compare and contrast Lamarck's explanation of evolution with Darwin's theory of evolution by natural selection	Recognize how organisms change over time	*Describe changes in organisms that have taken place over time	*Organize pictures of an organism's evolutionary history	*Create a picture timeline of an organism's evolutionary history	*Compare and contrast Lamarck's explanation and Darwin's Theory of Evolution	
Resources: Evolution		*Example: Compare pictures of fossils to present- day animals (e.g., elephant, horse, whale)	*Example: Organize pictures showing how a species of animal has changed over time (e.g., whale, horse, birds)	*Example: Create a timeline showing the evolution of an animal (e.g., whale, horse, birds)	*Examples: Compare using Venn diagram or T- chart	
HE.6.B.3 Analyze the effects of mutations and the resulting variations within a population in terms of natural selection	Recognize how natural selection results in variations within populations	Recognize that populations vary  Example: Group pictures of various species into an appropriate population (e.g., different breeds of dogs, horses, cows, cats)	Identify changes that occur in organisms for survival  Example: Use pictures of organisms that show camouflage, mimicry, other adaptations	Compare traits that allow natural selection  Example: Compare two animals and identify traits that enable them to survive in their environment	Analyze adaptations needed for natural selection  Example: Select pictures of terrestrial animals and describe or draw changes that would allow the animals to adapt to life in water	
Resources: Evolution						

Heredity and Evolution	Content Standard 6: Students shall examine the development of the <i>theory</i> of <i>biological evolution</i> .						
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	•	ory or shorogram over	More Complex		
HE.6.B.4 Illustrate mass extinction events using a time line	Identify events of mass extinction	Recognize that mass extinction is the loss of a species	Identify species on Earth that have become extinct	Depict mass extinction events	Research an extinct or endangered animal		
	over time	Example: Using pictures, create a timeline depicting time before and after the	Examples: Dinosaurs, saber- tooth cats, wooly mammoth, dodo bird	Example: Create a timeline that depicts two or more mass extinction events	Examples: Write a report; create a poster or slide show presentation		
Resources: Evolution, Mass Extinction		mass extinction of the dinosaurs					

Heredity and Evolution	Content Standard 6:						
•	Students sha	Students shall examine the development of the <i>theory</i> of <i>biological evolution</i> .					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	e <b>x</b>		More Complex		
HE.6.B.5 Evaluate evolution in terms of evidence as found in the following:  • fossil record  • DNA analysis	Recognize that the theory of evolution is supported by	Recognize that organisms leave proof of their existence	Identify specific evidences of evolution	Construct a model of a fossil	Research evidences of fossil records		
<ul> <li>artificial selection</li> <li>morphology</li> <li>embryology</li> <li>viral evolution</li> <li>geographic distribution of related species</li> <li>antibiotic and pesticide resistance in various organisms</li> </ul>	evidence	Examples: Place a finger in mud or plaster, fingerprint; cooking activities that use moldings	*Example: Create a representation of how fossils can be found in various layers on the Earth's surface	Examples: Create drawing, clay model, or plaster model of a fossil	*Examples: Report on fossils found in Arkansas; create slide presentation on fossils found in Arkansas		
Resources: Evolution, United Streaming							

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex		More Complex		
CDL.7.B.2 Differentiate the characteristics of the six kingdoms:	*Categorize organisms based on the characteristics of the six kingdoms	Identify different kingdoms	Match organisms to their correct kingdom based on common characteristics	Place appropriate organisms in their corresponding kingdom based on common characteristics	Create a model of a new organism and justify its inclusion into an existing kingdom based on common characteristics	
Animalia  Resources: Classification		Example: Match pictures of organisms to the correct kingdom, based on its characteristics (e.g., tree to plant kingdom, dog to animal kingdom, mushroom to fungi kingdom)	Examples: Use question & answer, quiz game, matching game	Example: Design photo pages of organisms using pictures taken on campus; group and label according to kingdom	Examples: Create model using cardboard, chenille wire, clay, plaster, or multimedia slide	
		Resources: AGFC				

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex			More Complex	
CDL.7.B.4 Classify and name organisms based on their similarities and differences applying taxonomic nomenclature using dichotomous keys	Recognize similarities and differences of organisms by using a classification key	Determine organisms can be classified by similarities and differences by use of a one step key	Classify an organism by using 3-4 step keys	Classify a collection of organisms by using a classification key	Design a classification key  Example:	
	Key	Example: Use pictures with yes or no answer key	Example: Choose animals and classify them based on where they live (e.g., rain forest, ocean, livestock, zoo)	Examples: Make leaf collection, insect collection, seed collection, wildflower collection	Create a key to identify common objects (e.g., eraser, pencil, paperclip, marble, donuts)	
Resources: Classification					Resources: Classification	
CDL.7.B.5 Investigate Arkansas' biodiversity using appropriate tools and technology	*Investigate biodiversity in Arkansas	Identify trees and animals in Arkansas	Identify organisms native to Arkansas	Categorize the biodiversity of Arkansas by state or regions	Create a depiction of Arkansas biodiversity	
		Examples: Identify through campus field study or picture study (e.g., cardinal, gray squirrel, pine tree, oak tree)	Example: Identify plants and/or animals native to Arkansas	Example: Scavenger hunt by state or region (e.g., fish animals, birds, plants)	Examples: Create a mural or poster	
Resources: Ecology			Resources: AGFC	Resource: Arkansas State Parks		

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	ex		More Complex	
CDL.7.B.7 Evaluate the medical and economic importance of viruses	*Describe the medical and/or economic importance of viruses	*Identify common viruses experienced by the class including medical and/or economic effects	*Explain how easily viruses are spread including the medical and/or economic significance	Assess current news events related to viruses	Research childhood diseases and vaccines	
		*Example: Create a flowchart indicating cause and effect of viral disease (e.g., stomach viruses, colds, West Nile, chicken pox, influenza)	Examples: Hand-washing technique using glitter-ball passed hand-to-hand (use make-up glitter)and complete Student Lab Activity Report; blow up balloon, place hole-punch pieces inside the balloon, pop the balloon and observe the spread of paper pieces then complete Student Lab Activity Report (see Appendix)	Example: Make a scrapbook of current events relating to viruses	*Examples: Research sources (e.g., Internet, school nurse, guest speaker to create a report, slide presentation, or poster	
Resources: Viruses, United Streaming			Resources: County Extension Office (Body Walk Program) AR Dept. of Health			

Classification and the Diversity of Life Content Standard 7. Students shall demonstrate an understanding that organisms are d					e.
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	ex		More Complex
CDL.7.B.8 Compare and contrast life cycles of familiar organisms sexual reproduction asexual reproduction metamorphosis	Describe how organisms reproduce and develop	Sequence different metamorphic organisms	Illustrate types of asexual reproduction	Distinguish different steps of fertilization	Compare and contrast sexual and asexual reproduction
alternation of generations		Examples: Ladybugs, frogs, butterflies	Example: Create a visual of one or more asexual processes (e.g., budding, regeneration, binary	Example: Label the steps in the fertilization of an egg	Example: Create a Venn diagram
Resources: United Streaming, Reproduction			fission, vegetative propagation)		

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.					
Student Learning Expectation	Essence of Student Learning Expectation  Essence of  Complex				More Complex	
CDL.7.B.17 Describe the structure and function of the major parts of a plant:  roots stems leaves	*Identify the various parts of a plant and the corresponding function(s)	Examine a live plant and identify its parts	Label the parts of a plant	Identify the function of each part of the plant. (root, stem, leaf, flower)	Construct a model of a plant	
• flowers  Resources: Plants		Examples: Lily, zinnia, rose	Example: See diagram in Appendix	Example: Label each plant part with the corresponding function(s) by playing pin the function on the plant game	Examples: Create model using clay, paper, chenille wire, foam board, plaster, multimedia slide	
CDL.7.B.19 Evaluate the medical and economic importance of plants	Explore the impact that plants have on our lives	Identify important plants that are used by humans	Associate plant products with the plant source	Identify plants that are economically important	Research plants that are medically beneficial	
Resource: Plants, United Streaming		Examples: Corn, potato, carrots, peas, cotton	Examples: Corn meal for human consumption or animal feed is made from corn; cloth for clothing or bedding is made from cotton	Examples: Soybeans or cotton can be used to produce many products; cash crops, such coffee or rice are sold in markets	Examples: Aloe vera, chamomile or aspirin (willow tree)	

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	x		More Complex
CDL.7.B.22 Compare and contrast the major vertebrate classes according to their nervous, respiratory, excretory, circulatory, digestive, reproductive and	*Investigate the major body systems of vertebrates	*Recognize the major body systems of vertebrates	*Match body systems to their major functions	Explain the function of body systems	*Research and report information about the functions of various body systems
integumentary systems  Resources: United Streaming, Body Systems		*Example: Outline the human body, include one body system, and label the major organs (e.g., digestive, respiratory)	Example: Use Internet activity to match body systems to their functions  Resources: Body Systems	Examples: Use graphic organizer or foldables	*Examples: Write a report; create a poster or slide presentation

Ecology and Behavioral Relationships	Content Standard 8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.					
Student Learning Expectation	Essence of Student Learning Expectation	Student Less Complex Learning			More Complex	
EBR.8.B.1 Cite examples of abiotic and biotic factors of ecosystems	Identify living and nonliving things	Recognize living and nonliving things	Locate pictures or representations of living and nonliving things	Collect examples of living and nonliving things	Model an ecosystem with living and nonliving things	
Resources: Ecology, United Streaming		Example: Match or sort living/nonliving things using picture cards	Examples: Scavenger hunt; find pictures in magazines	Example: Collect and label examples of living things (e.g., insects, leaves, wildflowers) and nonliving things (e.g., rocks, minerals, soil)	Example: Terrarium, aquarium, diorama	
EBR.8.B.2 Compare and contrast the characteristics of <i>biomes</i>	*Compare characteristics of biomes	*Recognize that there are a variety of biomes on Earth	Determine the types of biomes	Classify organisms to their biomes	Illustrate the characteristics of a biome	
Resources: Ecology, United Streaming		*Examples: Using pictures, group biomes by characteristics (e.g., hot-cold, dry-wet, trees-no trees)	*Examples: Match pictures of biomes to the appropriate name; create a biome collage or notebook	Example: Match plants and animals to the appropriate biome	*Examples: Create a representation of a biome (e.g., diorama, slide presentation, poster)	

Ecology and Behavioral Relationships	Content Standard 8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.					
Student Learning Expectation	Essence of Student Learning Expectation				More Complex	
EBR.8.B.3 Diagram the carbon, nitrogen, phosphate, and water cycles in an <i>ecosystem</i>	Illustrate ecosystem cycles	Recognize that materials move in a system	Describe an example of movement of materials	Sequence the steps of an ecosystem cycle	Illustrate the steps in an ecosystem cycle	
		Example: Measure and record the evaporation of water over time	Example: Chart precipitation patterns	Examples: Magnets, pictures, skit	Example: Diagram one or more of the listed cycles	
Resources: Ecology						
EBR.8.B.4 Analyze an ecosystem's energy flow through food chains, food webs, and energy pyramids	Recognize how energy flows through an ecosystem	Recognize that organisms need energy	Demonstrate the linear flow of energy in living things	Distinguish between producers and consumers	Describe complex energy flow among living things in an ecosystem	
		Example: Students respond to questions (e.g., Why do you need to eat? Why do plants need water and sunlight?)	Example: Construct a food chain	Examples: Sort pictures; create T- chart or Venn diagram	Example: Construct a food web indicating the flow of energy through an ecosystem	
Resources: Ecology, United Streaming		ournight: )				

Ecology and Behavioral Relationships	Content Standard 8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	ex		More Complex	
EBR.8.B.5 Identify and predict the factors that control population, including predation, competition, crowding, water, nutrients, and	Identify factors that control population size	Recognize basic needs of organisms	Recognize factors that limit population size	Predict the effect of factors on population growth	Analyze population growth	
shelter		Examples: Food, water, shelter, air, space	Example: See camouflaged butterfly activity in Resources  Resources:	Examples: Predator/prey relationships, mutualism, water supply, food supply, natural disasters	Example: Construct a graph displaying change in population size over time	
EBR.8.B.8 Identify the properties of each of the five levels of ecology:	Distinguish among the levels of ecology	Identify levels of ecology	Sequence the levels of ecology from specific to whole	Model the levels of ecology	Examine levels of ecology	
<ul> <li>Organism</li> <li>Population</li> <li>community</li> <li>ecosystem</li> <li>biosphere</li> </ul>	ecology	Example:	Example: Arrange pictures in order of ecological levels	Example: Construct diagram displaying relationships existing among parts of an ecosystem	Example: Mark off a three (3) square meter area outside, record examples of ecological levels within the area, and complete the Student Lab/Activity	
Resources: Ecology, United Streaming					Report (see Appendix)	

Ecology and Behavioral Relationships	Content Standard 9. Students shall demonstrate an understanding of the ecological impact of global issues.					
Student Learning Expectation	Essence of Student Learning Expectation	Less Comple	ex		More Complex	
EBR.9.B.1 Analyze the effects of human <i>population</i> growth and <i>technology</i> on the environment/ <i>biosphere</i>	Describe effects that humans have on the environment	Recognize that humans affect the environment	Identify positive and negative human effects on the environment	Predict the effects of human population growth on the environment	Research positive/negative human impacts on the environment	
Resources: Ecology		Examples: Pollution, global warming, picking up trash, recycling	Examples: Construct a list of ways to conserve energy; create flyers and/or brochures	Examples: Food shortage, loss of habitat, extinct species	Examples: Create an informative poster, report, or multi-media presentation defending the protection of an endangered species	
EBR.9.B.3 Assess current world issues applying scientific themes (e.g., global changes in climate, epidemics, pandemics, ozone depletion, UV radiation, natural	Examine current science issues that affect the world	Recognize that science is in the news	Identify a current world issue with a scientific theme	Describe a current world issue with a scientific theme	Research and report causes and effects of current world issues with scientific themes	
resources, use of <i>technology</i> , and public policy)		Examples: Create a scrapbook, bulletin board, or journal using newspaper articles	Example: Classify articles or multimedia presentations around a particular scientific topic reported in the news	Example: Write and perform a skit	Examples: Write report; create poster or slide presentation	

# **Biology Glossary for Grade 10 Science**

Abiotic factor	Any nonliving component of an <i>ecosystem</i> (e.g., sunlight, air, water, soil)
Activation energy	The kinetic energy required to initiate a chemical reaction
Active transport	The movement of a substance across a plasma (cell) membrane against a concentration gradient
Adhesion	The property of sticking to some other substance
Aerobic respiration	Growing or metabolizing only in the presence of molecular oxygen
Alcoholic	The process by which pyruvic acid is converted to ethyl alcohol
fermentation	
Alleles	Alternate forms of a <i>gene</i> or <i>DNA</i> sequence, which occur on either of two homologous <i>chromosomes</i> in a diploid organism
Alternation of generation	Alternating sexual and asexual generation reproduction
Amino acid	Any of 20 basic building blocks of <i>proteins</i> composed of a free amino (NH2) end, a free carboxyl (COOH) end, and a side group (R)
Anaerobic	Growing or metabolizing only in the absence of molecular oxygen
respiration	
Anaphase	Third phase of <i>mitosis</i> , beginning when sister <i>chromatids</i> separate from each other and ending when a complete set of
	daughter chromosomes have arrived at each of the two poles of the cell
Antibiotic	The ability of a microorganism to produce a <i>protein</i> that disables an antibiotic or prevents transport of the antibiotic into the
resistance	cell
Applied science	The practical use of scientific information to improve human life
Artificial selection	Breeding organisms by humans for specific phenotypic characteristics
Asexual	Nonsexual means of reproduction which can include grafting and budding
reproduction	
Autotroph	An organism that uses energy to synthesize organic molecules from inorganic substances
Bacteria	A single-celled, microscopic prokaryotic organism
Base pair (bp)	A pair of complementary nitrogenous bases in a DNA molecule
Biodiversity	The wide diversity and interrelatedness of earth organisms based on genetic and environmental factors
Biological evolution	Change in allele frequency of a <i>species</i> or <i>population</i> over time
Biome	A geographic area characterized by specific kinds of plants and animals
Biosphere	The area on and around Earth where life exists
Biotic factor	A living component of an ecosystem
Carbohydrates	Compound containing carbon, hydrogen, and oxygen in the approximate ratio of C:2H:O (e.g., sugars, starches, and cellulose)

Cell cycle	The events of cell division; includes interphase, mitosis, and cytokinesis
Cellular respiration	The process by which cells generate ATP through a series of redox (chemical) reactions
Cell theory	The theory that all living things are made of cells, that cells are the basic units of organisms, and that cells come only from
-	existing cells
Centromere	The central portion of the <i>chromosome</i> to which the spindle fibers attach during mitotic and meiotic division
Chloroplasts	A plastid containing chlorophyll; the site of <i>photosynthesis</i>
Chromatid	Each of the two daughter strands of a duplicated <i>chromosome</i> joined at the <i>centromere</i> during <i>mitosis</i> and <i>meiosis</i> .
Chromosome	A single DNA molecule, a tightly coiled strand of DNA
Chromosome	The theory that states that genes are located on chromosomes and that each gene occupies a specific place on a
theory of heredity	chromosome
Citric acid cycle	Series of chemical reactions in aerobic respiration in which a acetyl coenzyme A is completely degraded to carbon dioxide
(Kreb's)	and water with the release of metabolic energy that is used to produce ATP; also known as Kreb's cycle
Cladogram	A branching diagram that illustrates taxonomic relationships based on the principles of claudistics
Codominance	An inheritance relationship in which neither of two alleles of the same gene totally mask the other
Cohesion	The property of sticking together; like substances sticking together
Commensalism	The close association of two or more dissimilar organisms where the association is advantageous to one and doesn't affect
	the other(s)
Community	All the <i>populations</i> in one area
Cytokinesis	The division of cytoplasm of one cell into two new cells
Cytoskeleton	Framework of the cell composed of a variety of filaments and fibers that support cell structure and drive cell movement
Deletion	Chromosome abnormality in which part of the chromosome is missing; loss of one or more base pairs from DNA which can result in a frameshift
Dichotomous key	Classification tool used in identifying organisms or materials
(classification key)	
Diffusion	The process by which molecules move from an area of greater concentration to an area of lesser concentration
DNA	An organic acid and polymer composed of four <i>nitrogenous bases</i> adenine, thymine, cytosine, and guanine; the genetic
(Deoxyribonucleic	material of most organisms; exists as a double-stranded molecule held together by hydrogen bonds
acid)	
Domain	Taxonomic category that includes one or more kingdom (e.g., Bacteria, Archaea, Eukarya)
Dominance	A characteristic in which an allele that expresses its <i>phenotype</i> even in the presence of a recessive allele
Double helix	The <i>DNA</i> molecule, resembling a spiral staircase in which the paired bases form the steps and the sugar-phosphate backbones form the rails
Ecology	The study of the interactions of organisms with their environment and with each other
Ecosystem	The organisms in a plant population and the biotic and abiotic factors which impact on them
Electron transport	Series of chemical reactions in the thylakoid membrane or inner mitochondrial membrane during which hydrogens or their
chain	electrons are passed along with the release of energy

Endocytosis Energetics Use of energy Use of energy Summarizes interactions of matter and energy at each trophic level Enzymes Epidemic An outbreak of a contagious disease that spreads widely and rapidly Eukaryote An organism whose cells possess a nucleus and other membrane-bound vesicles, including all members of the protist, fungi, plant and animal kingdoms, and excluding viruses, bacteria, and blue-green algae Evolution The long-term process through which a population of organisms accumulates genetic changes that enable its members to successfully adapt to environmental conditions and to better exploit food resources Exergonic reaction Execytosis The process in which a vesicle inside a cell fuses with a cell membrane and releases its contents to the external environment Exocytosis The process in which a vesicle inside a cell fuses with a cell membrane and releases its contents to the external environment Frameshift Mutation Frameshift Microorganisms that lacks chlorophyll Gamete A haploid sex cell, egg or sperm, that contains a single copy of each chromosome Gene The functional unit of heredity; a locus on a chromosome that encodes a specific protein or several related proteins Genome The complete genetic material contained in an individual; the genetic complement contained in the chromosomes of a given organism, usually the haploid chromosome state Genotype The structure of DNA that determines the expression of a trait Genus A category including closely related species; interbreeding between organisms within the same category can occur A set of criteria used to establish that a particular infectious agent causes a disease  Disease (Koch's Postulates) Postulates Postulates Animal or plant on which or in which another organism lives Animal or plant on which or in which another organism lives Animal or plant on which or in which another organism lives Animal or plant on which or in which another organism lives Animal or plant on which or in which another organism lives Animal or plant on which or in which anoth	Endergonic	A reaction requiring a net input of free energy
Energy pyramid Energy pyramid Energy pyramid Summarizes interactions of matter and energy at each trophic level Enzymes Proteins that control the various steps in all chemical reactions Epidemic An outbreak of a contagious disease that spreads widely and rapidly Eukaryote An organism whose cells possess a nucleus and other membrane-bound vesicles, including all members of the protist, fungi, plant and animal kingdoms; and excluding viruses, bacteria, and blue-green algae Evolution The long-term process through which a population of organisms accumulates genetic changes that enable its members to successfully adapt to environmental conditions and to better exploit food resources Exergonic reaction Exocytosis The process in which a vesicle inside a cell fuses with a cell membrane and releases its contents to the external environment Frameshift A mutation that results in the misreading of the code during translation because of the change in the reading frame mutation  Fungi Microorganisms that lacks chlorophyll Gamete A haploid sex cell, egg or sperm, that contains a single copy of each chromosome Gene The functional unit of heredity: a locus on a chromosome that encodes a specific protein or several related proteins The complete genetic material contained in an individual; the genetic complement contained in the chromosomes of a given organism, usually the haploid chromosome state Genotype The structure of DNA that determines the expression of a trait Genus Germ Theory of Disease (Koch's Postulates) Glycolysis A pathway in which glucose is oxidized to pyruvic acid Heterotroph An organism that obtains organic food molecules by eating organisms or their by-products The stable internal conditions of a living thing Hondon A relatively weak bond formed between any hydrogen atom (which is covalently bound to a nitrogen or oxygen atom) and a nitrogen or oxygen with an unshared electron pair Hypotheses Incomplete A condition where a heterozygous off- spring has a phenotype that is distinctly different from, and intermedi	reaction	The presence by which a cell currounds and engulfaculations
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Gene The functional unit of heredity; a locus on a <i>chromosome</i> that encodes a specific <i>protein</i> or several related <i>proteins</i> The complete genetic material contained in an individual; the genetic complement contained in the <i>chromosomes</i> of a given organism, usually the haploid <i>chromosome</i> state  Genotype The structure of <i>DNA</i> that determines the expression of a trait  Genus A category including closely related <i>species</i> ; interbreeding between organisms within the same category can occur  Germ Theory of Disease (Koch's Postulates)  Glycolysis A pathway in which glucose is oxidized to pyruvic acid  Heterotroph An organism that obtains organic food molecules by eating organisms or their by-products  The stable internal conditions of a living thing  Host Animal or plant on which or in which another organism lives  Human Genome Project A project coordinated by the National Institutes of Health (NIH) and the Department of Energy (DOE) to determine the entire <i>nucleotide</i> sequence of the human <i>chromosomes</i> Hydrogen bond A relatively weak bond formed between any hydrogen atom (which is covalently bound to a nitrogen or oxygen atom) and a nitrogen or oxygen with an unshared electron pair  Hypotheses Statement or predictions that can be tested  Incomplete A condition where a heterozygous off- spring has a <i>phenotype</i> that is distinctly different from, and intermediate to, the	Fungi	Microorganisms that lacks chlorophyll
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Incomplete A condition where a heterozygous off- spring has a <i>phenotype</i> that is distinctly different from, and intermediate to, the	Hypotheses	
	dominance	parental phenotypes

Independent	The law stating that pairs of genes separate independently of one another in meiosis		
assortment			
Interphase	Period of time where a cell carries on metabolism and replicates <i>chromosomes</i> prior to cell division		
Inversion	A mutation that occurs when a chromosome piece breaks off and reattaches in reverse orientation		
k-strategist	Species characterized by slow maturation, few young, slow population growth and reproduction late in life		
Karyotype	All of the chromosomes in a cell or an individual organism, visible through a microscope during cell division		
Law	An observation that happens every time under a certain set of conditions		
Lactic acid fermentation	The process by which pyruvic acid is converted to lactic acid		
Light dependent	Reaction of <i>photosynthesis</i> that requires light; light energy is absorbed converted to chemical energy in the form of ATP and NADPH		
Light independent	The fixing of carbon dioxide in a 3 carbon compound for use in sugar production or other end products		
Lipid	Any of a group of organic compounds that are insoluble in water but soluble in nonpolar solvents; serve as energy storage and are important components of cell membranes		
Lysogenic cycle	A type or phase of the <i>virus</i> life cycle during which the <i>virus</i> integrates into the <i>host chromosome</i> of the infected cell, often remaining essentially dormant for some period of time		
Lytic cycle	A phase of the <i>virus</i> life cycle during which the <i>virus</i> replicates within the <i>host</i> cell, releasing a new generation of <i>virus</i> es when the infected cell lyses		
Mass extinction	One of the brief periods of time during which large numbers of species disappeared		
Meiosis	The reduction division process by which haploid gametes and spores are formed consisting of a single duplication of the		
	genetic material followed by two mitotic divisions		
Metaphase	Second phase of <i>mitosis</i> in which the <i>chromosomes</i> line up across the equator of the cell		
Microbe	A microorganism		
Mitochondria	Organelles that are the sites of aerobic respiration in eukaryotic cells		
Mitosis	The replication of a cell to form two daughter cells with identical sets of chromosomes		
Molecular biology	The study of the biochemical and molecular interactions within living cells		
Molecular genetics	The branch of genetics that deals with the expression of genes by studying the DNA sequences of chromosomes		
Multiple alleles	Three or more alleles of the same gene that code for a single trait		
Mutation	An alteration in DNA structure or sequence of a gene		
Mutualism	A form of symbiosis in which both organisms benefit from living together		
Natural selection	The differential survival and reproduction of organisms with genetic characteristics that enable them to better utilize environmental resources		
Nitrogenous bases	The purines (adenine and guanine) and pyrimidines (thymine, cytosine, and uracil) that comprise DNA and RNA molecules		
Nonvascular plant	A plant that lacks vascular tissue and true roots, stems, and leaves		
Nucleic acids	The two <i>nucleic acids</i> , deoxyribonucleic acid ( <i>DNA</i> ) and ribonucleic acid ( <i>RNA</i> ), are made up of long chains of molecules called <i>nucleotides</i>		
Nucleotide	A building block of <i>DNA</i> and <i>RNA</i> , consisting of a nitrogenous base, a five-carbon sugar, and a phosphate group		
<u> </u>			

Nucleus	The membrane-bound region of a eukaryotic cell that contains the <i>chromosomes</i>			
Organelle	A cell structure that carries out a specialized function in the life of a cell			
Osmosis	The diffusion of water across a selectively permeable membrane			
Parasitism	, ,			
	The close association of two or more dissimilar organisms where the association is harmful to at least one			
Passive transport	The movement of substances across a plasma (cell) membrane without the use of cell energy			
Pandemic	An epidemic over a wide geographic area and affecting an exceptionally high proportion of the population			
Pathogen	Organism which can cause disease in another organism			
Pesticide	A substance that kills harmful organisms (e.g., an insecticide or fungicide)			
pH	Indicates the relative concentration of hydrogen ions and hydroxide ions in a substance			
Pinocytosis	A type of <i>endocytosis</i> in which a cell engulfs solutes of fluids			
Phagocytosis	A type of <i>endocytosis</i> in which a cell engulfs large particles or whole cells			
Phenotype	The observable characteristics of an organism, the expression of <i>gene alleles</i> ( <i>genotype</i> ) as an observable physical or biochemical trait			
Phospholipids	A class of <i>lipid</i> molecules in which a phosphate group is linked to glycerol and two fatty acetyl groups; a chief component of biological membranes			
Photosynthesis	The process by which light energy is converted to chemical energy stored in organic molecules			
Plasma (cell)	A selectively permeable surface that encloses the cell contents and through which all materials entering or leaving a cell			
membrane	must pass			
Point mutation	A change in a single base pair of a DNA sequence in a gene			
Polarity	Molecules having uneven distribution of charges			
Population	A local group of organisms belonging to the same <i>species</i> and capable of interbreeding			
Primary succession	Succession that occurs in a newly formed habitat that has never before sustained life			
Prokaryote	A bacterial cell lacking a true <i>nucleus</i> ; its <i>DNA</i> is usually in one long strand			
Prophase	First phase of <i>mitosis</i> in which duplicated <i>chromosomes</i> condense and mitotic spindle fibers begin to form			
Protein	An organic compound composed of one or chains of polypeptides which in turn are formed from amino acids			
Protein synthesis	A formation of <i>proteins</i> using information coded on <i>DNA</i> and carried by <i>RNA</i>			
Pure science	The gathering of new information or the discovery of a new relationship or fact for sake of knowledge			
Punnett square	A type of grid used to show the gametes of each parent and their possible offspring; a type of grid that can indicate all the			
•	possible outcomes of a genetic cross			
Radioactive dating	A method of determining the age of an object by measuring the amount of a specific radioactive isotope it contains			
Recessive gene	Characterized as having a phenotype expressed only when both copies of the gene are mutated or missing			
Relative dating	A method of determining the age of fossils by comparing them to other fossils in different layers of rock			
Ribosome	A sub-cellular structure that is the site of <i>protein synthesis</i> during <i>translation</i> .			
RNA (ribonucleic	An organic acid composed of a single strand of <i>nucleotide</i> that acts as a messenger between <i>DNA</i> and the <i>ribosomes</i> and			
acid)	carries out the process of <i>protein synthesis</i> : composed units of adenine, guanine, cytosine, and uracil			
Secondary	The sequential replacement of <i>population</i> in a disrupted habitat			
succession				

Segregation	The law stating that pairs of genes separate in meiosis and each gamete receives one gene of a pair			
Sex influenced	Description of a trait that is caused by a <i>gene</i> whose expression differs in male and females; (e.g., male patterned baldness)			
Sex linkage	The presence of a <i>gene</i> on a sex <i>chromosome</i> ; (e.g., hemophilia, color-blindness)			
Sexual	The process where two cells (gametes) fuse to form one hybrid, fertilized cell			
reproduction				
Species	A classification of related organisms that can freely interbreed			
Spore	A form taken by certain <i>microbes</i> that enables them to exist in a dormant stage. It is an asexual reproductive cell			
Symbiosis	The close association of two or more dissimilar organisms where both receive an advantage from the association			
Taxonomic	The procedure of assigning names to the kinds and groups of organisms according to their taxa			
nomenclature				
Technology	Practical use of scientific information to improve the quality of human life: see also applied science			
Telophase	Final phase of mitosis during which chromosomes uncoil, a nuclear envelope returns around the chromatin, and a nu			
	becomes visible in each daughter cell			
Theory	A well tested explanation of natural events			
Thermoregulation	The maintenance of internal temperature within a range that allows cells to function efficiently			
Translation	The process of converting the genetic code in RNA into the amino acid sequence that makes up a protein			
Transcription	Process in which RNA is made from DNA			
Vaccine	A preparation of dead or weakened <i>pathogen</i> that is used to induce formation of antibodies or immunity against the <i>pathogen</i>			
Variation	Differences in the frequency of <i>genes</i> and traits among individual organisms within a <i>population</i>			
Vascular plants	A plant that has phloem and xylem			
Virus	An infectious particle composed of a <i>protein</i> capsule and a nucleic acid core, which is dependent on a <i>host</i> organism for replication			

# **Appendix**

## Resources for Grade 10 Science Alternate Assessment

Resource	Where to find it
Animals and Plants	Arkansas Game and Fish Commission (AGFC): http://www.agfc.com/education-class/programs.aspx
	Plant and animal characteristics: <a href="http://www.epa.ie/researchandeducation/education/">http://www.epa.ie/researchandeducation/education/</a>
	Parts of a plant: http://www.primaryresources.co.uk/online/powerpoint/flower.ppt
	http://its.guilford.k12.nc.us/webquests/plantquest/
	http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=6988
Body Systems	http://www.sciencenetlinks.com/interactives/systems.html
	http://www.getbodysmart.com/
	http://www.medtropolis.com/VBody.asp
Cells	http://pers.dadeschools.net/prodev/world_of_cells.htm
	http://www.cellsalive.com/
	http://www.usoe.k12.ut.us/curr/science/sciber00/7th/cells/sciber/cellcomp.htm
	http://www.ecostudies.org/chp/Module1/1C8A_Aquatic_Interactions.pdf
Classification	Dichotomous Key: http://sciencespot.net/Media/sillysci.pdf
	http://www.scribd.com/doc/9682508/Classification-Dichotomous-Key-Doughnut-Sort
	http://watershed.csumb.edu/ron/roncor/cor/did.htm
	Insects: http://sciencespot.net/Pages/kdzinsect.html
	Kingdoms: http://www.ric.edu/ptiskus/Six_Kingdoms/Index.htm
	Leaf collection: http://forestry.about.com/od/treeidentification/a/leaf_collection.htm
Cooperative	http://www.uaex.edu/
Extension Service	
Ecology	Camouflaged Butterfly Activity: <a href="http://sftrc.cas.psu.edu/LessonPlans/Wildlife/AnimalCamouflage.html">http://sftrc.cas.psu.edu/LessonPlans/Wildlife/AnimalCamouflage.html</a>
	Missouri Botanical Gardens: <a href="http://www.mbgnet.net/">http://www.mbgnet.net/</a>
	How to make a terrarium: <a href="http://www.instructorweb.com/lesson/maketerrarium.asp">http://www.instructorweb.com/lesson/maketerrarium.asp</a>
	Biodiversity: <a href="http://www.naturalheritage.com/">http://www.naturalheritage.com/</a>
	State Parks: http://www.arkansasstateparks.com/
	Food Chains and Biomes: <a href="http://www.picadome.fcps.net/lab/currl/food_chain/default.htm">http://www.picadome.fcps.net/lab/currl/food_chain/default.htm</a>
	http://www.thewildclassroom.com/biomes/biomes/index.html
	http://www.harcourtschool.com/activity/food/food_menu.html
	Cycles: <a href="http://www.kidzone.ws/water/">http://www.kidzone.ws/water/</a>
	http://epa.gov/climatechange/kids/carbon_cycle_version2.html
	Ecosystems: <a href="http://necsi.org/projects/evolution/co-evolution/pred-prey/co-evolution_predator.html">http://necsi.org/projects/evolution/co-evolution/pred-prey/co-evolution_predator.html</a>
	Human impact: http://www.census.gov/main/www/popclock.html
	http://www.hobart.k12.in.us/jkousen/Biology/impact.html

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Energy	Calories burned: <a href="http://www.tooelehealth.org/Community_Health/CVD/Calories_Burned.html">http://www.tooelehealth.org/Community_Health/CVD/Calories_Burned.html</a>			
	Learning about calories: <a href="http://kidshealth.org/kid/stay_healthy/food/calorie.html">http://kidshealth.org/kid/stay_healthy/food/calorie.html</a>			
	How to read a nutrition label: <a href="http://www.cfsan.fda.gov/~dms/foodlab.html#twoparts">http://www.cfsan.fda.gov/~dms/foodlab.html#twoparts</a>			
	American Dairy Council Nutrition Games: <a href="http://www.adadc.com/index_files/EducatorsArea.html">http://www.adadc.com/index_files/EducatorsArea.html</a>			
Genetics	Interactive Genetics website: <a href="http://www.dnalc.org/home.html">http://www.dnalc.org/home.html</a>			
	Elementary genetics: <a href="http://www.ology.amnh.org/genetics/index.html">http://www.ology.amnh.org/genetics/index.html</a>			
	http://www.yourgenome.org/			
	Geneticists: http://www.pbs.org/wgbh/aso/databank/index.html			
	Punnett squares: http://www.emints.org/ethemes/resources/S00001476.shtml			
	DNA model: http://school.discovery.com/lessonplans/programs/modeldna/			
	Interactive DNA model: <a href="http://learn.genetics.utah.edu/units/basics/builddna/">http://learn.genetics.utah.edu/units/basics/builddna/</a>			
	Reebops: http://www.scpub.org/data//files/copyreebops-9742.pdf			
	Major discoveries in genetics: <a href="http://science.discovery.com/convergence/100discoveries/big100/genetics.html">http://science.discovery.com/convergence/100discoveries/big100/genetics.html</a>			
	Sickle cell anemia: <a href="http://school.discoveryeducation.com/lessonplans/programs/bodybydesign/">http://school.discoveryeducation.com/lessonplans/programs/bodybydesign/</a>			
	DNA model lesson: <a href="http://www.umaine.edu/nsfgk-12/images/PDFs/gumdrop.pdf">http://www.umaine.edu/nsfgk-12/images/PDFs/gumdrop.pdf</a>			
	Build a DNA model: <a href="http://nobel.scas.bcit.ca/resource/dna/dna_sweets.htm">http://nobel.scas.bcit.ca/resource/dna/dna_sweets.htm</a>			
Lab Descriptions	Diffusion and other labs: <a href="http://www.biology-resources.com/biology-experiments2.html#Diffusion">http://www.biology-resources.com/biology-experiments2.html#Diffusion</a>			
	Collecting water from a plant: <a href="http://scene.asu.edu/habitat/activities/leaf_transpiration.html">http://scene.asu.edu/habitat/activities/leaf_transpiration.html</a>			
	Anerobic Respiration (fermentation): http://www.lesaffreyeastcorp.com/SoY/educators.html			
	http://www.funsci.com/fun3_en/exper1.htm			
	Assorted: http://www.middleschoolscience.com/life.htm			
	http://www.madsci.org/			
	http://school.discovery.com/			
	http://powayusd.sdcoe.k12.ca.us/pusdcves/er_fourth.htm			
Mass Extinction	http://dsc.discovery.com/earth/wide-angle/mass-extinctions-timeline.html			
Properties of Water	Arkansas Project Wet:: http://www.adeq.state.ar.us/water/branch_planning/watershed_outreach_education/projectwet.htm			
	Iowa Project Wet: http://www.uni.edu/~iowawet/H2OProperties.html			
Recipe	Amish Bread recipe: http://www.armchair.com/recipe/bake002.html			
Reproduction	Asexual reproduction: http://biology.about.com/library/gallery/blhydra.htm			
	http://www.saburchill.com/chapters/chap0031.html			
	Sexual reproduction: http://www.saburchill.com/chapters/chap0037.html			
	Insect metamorphosis video: http://www.pbs.org/wgbh/nova/satoyama/transform.html			
	Frog metamorphosis pictures: <a href="http://www.countrysideinfo.co.uk/metimage.htm">http://www.countrysideinfo.co.uk/metimage.htm</a>			

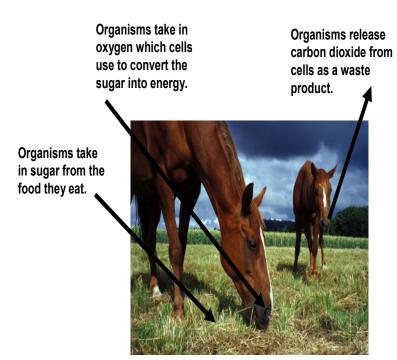
United Streaming videos, blackline masters and quizzes on a variety of science topics	http://science.nasa.gov/ http://www.cnn.com/TECH/space/ http://www.eurekalert.org/ http://www.pbs.org/saffeducators.htm http://www.nasa.gov/ision/space/livinginspace/index.html http://pumas.jpl.nasa.gov/ http://health.discovery.com/ www.unitedstreaming.com  Animal Adaptations  Basics of Biology, The: How Living Things are Structured  Biologically Speaking: Genetics and Heredity  Biologically Speaking: Systems of the Human Body  Biology: The Science of Life: Ecology: Organisms in Their Environment  Biology: The Science of Life: Making New Life: The Basics of Reproduction  Biology: The Science of Life: The Flow of Matter and Energy in the Living World: Photosynthesis and Cellular Respiration Biomes: Our Earth's Major Life Zones  Cheese Factory  Energy and the Chemistry of Life  Evolution  Greatest Discoveries with Bill Nye: Genetics Importance of Plants, The Learning About Ecology  Life Science: Viruses  Natural Selection of Plants and Animals				
	Natural Selection of Plants and Animals				
	Reproduction in Organisms				
	Simply Science: Maintaining Equilibrium				
Nr	TLC Elementary School: Life Cycles				
Viruses	http://www.bam.gov/ http://www.archives.gov/exhibits/influenza-epidemic/				

### **Activities and Worksheets**

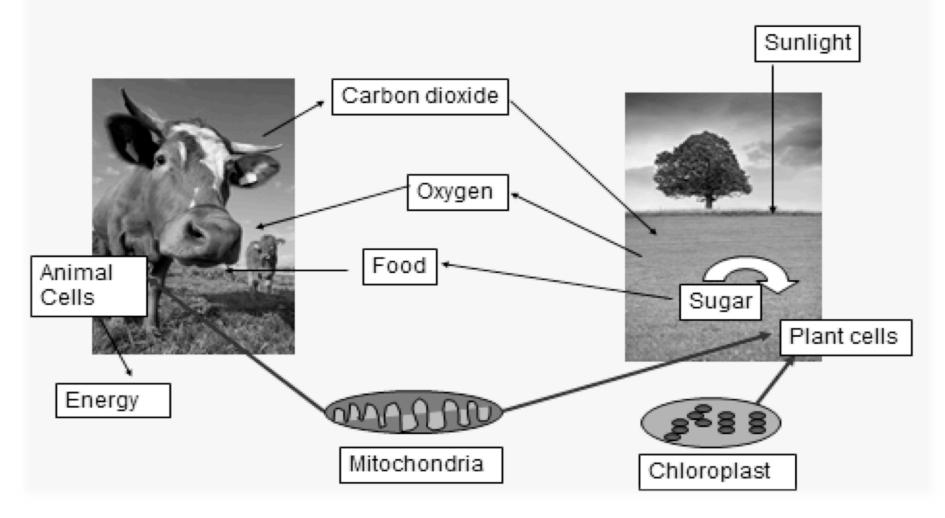
- 1. Photosynthesis and Respiration
- 2. Comparison of Mitochondria and Chloroplasts
- 3. Label the Parts of a Plant
- 4. Aerobic and Anaerobic Respiration
- 5. Animal and Plant Cell Observation Chart
- 6. Food Diary
- 7. Compare carbohydrates, lipids, proteins, and nucleic acids
- 8. Celery Activity: Investigate the properties and importance of water
- 9. Penny Activity: Investigate the properties and importance of water
- 10. Pollution Activity
- 11. Science Lab/Activity Report Sheet

## Photosynthesis Sunlight strikes the leaf and is absorbed by chlorophyll Water enters from the roots Sugar is produced Oxygen is produced Carbon and exits dioxide into the enters from atmosphere the air

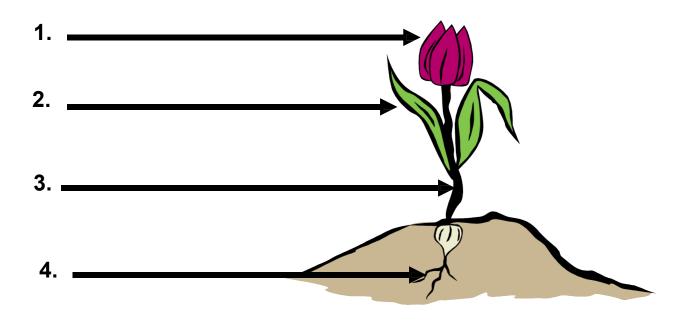
# Respiration



# Comparison of Mitochondria and Chloroplasts

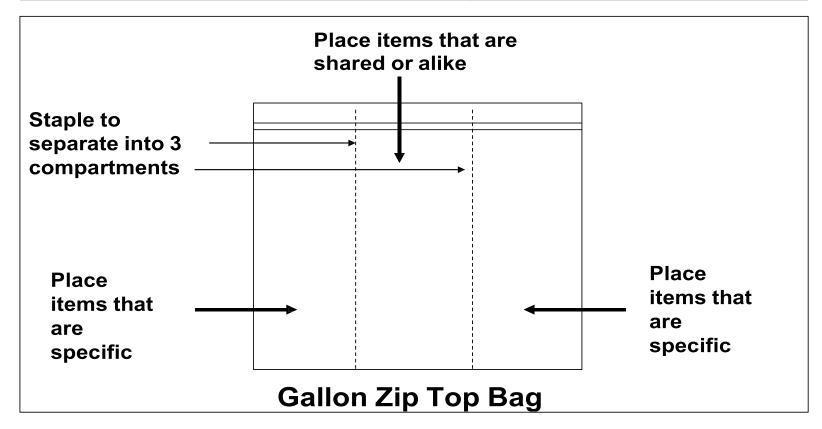


## Label the Parts of a Plant



Stem Root Flower Leaf

# Physical Example of a Venn Diagram



Name:	Date:	

## Aerobic and Anaerobic Respiration

Compare the processes of aerobic and anaerobic respiration by placing an X in the correc box.

Pro	ocess	With oxygen	Without oxygen
Cow getting energy from eating grass			
Changing milk into buttermilk			
Kids using energy to play soccer			
Yeast making bread rise			
Making yogurt from milk	You		

## Animal and Plant Cell Observation Chart

If you observe the cell structure, write "YES" in the space. If you do **not** observe the cell structure, write "NO" in the space.

Cell Structures	Animal Cell	Plant Cell
Cell membrane		
Nucleus		
Ribosome		
Endoplasmic Reticulum		
Mitochondria		
Golgi Complex		
Chloroplast		
Cell wall		
Vacuole		

Name:	Date:

## MC.1.B.1

## **Food Diary**

	Foods	Carbs	Lipids	Proteins	Stored Energy	Quick Energy	Builds Muscle
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Name:	Date:
-	

## MC.1.B.1

Compare carbohydrates, lipids, proteins, and nucleic acids by completing the table below.

	Carbohydrates	Lipids	Proteins	Nucleic Acids
Contains which elements? (circle all that apply)	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen
Examples of foods				Your body makes nucleic acids from the foods that you eat
How is it used by your body?				

List the elements that are found in all of the molecules.

2. What molecule(s) contain nitrogen?

3. Which molecule is made up of only carbon, hydrogen, and oxygen?

## Celery Activity: Investigate the properties and importance of water

#### Materials:

- Stalks of celery with leaves attached
- Glass or jar of water
- Red or blue food coloring
- Table knife

#### **Background:**

Adhesion is the attraction of a water molecule to other types of molecules (like the inside surface of a straw). Cohesion is the attraction of water molecules to other water molecules. Together these properties allow water molecules to travel up a tube such as a plant stem.

#### Activity:

- 1. Add enough food coloring to the water to give it a dark color
- 2. The teacher should use a knife and cut about an inch off of the bottom of the end of each stalk
- 3. Place the celery stalks in the water.
- 4. Observe the celery several times a day to determine if the color has moved up the stalk and leave overnight.
- 5. The next day observe the color of the leaves of on the stalk. Starting at the bottom of the stem, the teacher should cut off an inch at a time and allow the students to observe the tiny holes that have the same color as the food coloring.

Observations:	<b>△</b> 1		- 4	
Obselvations.	Inc	Arv.	STIA	nei
	ODS	CIV	auv	ııs.

1.	Describe how the celery appeared after 1 hour
2.	Describe how the celery appeared the next day.
3.	Describe how the celery looked on the inside.
4.	Describe the two properties of water that allowed the water to move up the stem of the celery.
5.	Describe why these properties are important to plants.

#### **Answers:**

- 1. Student should record their observations
- 2. The leaves of the celery should have taken on the color of the food coloring
- 3. There should be small round holes that are stained the color of the food coloring (these are called xylem tubes)
- 4. Adhesion- the property of water sticking to surfaces

Cohesion – the property of water molecules sticking to other water molecules

5. These properties are important because they allow water to move through tubes from the soil to all parts of a plant. The plant would not be able to grow very tall if water could not move through the plant.

Note: This activity also works well with carnations or white daisies.

Na	me:Date:
	Penny Activity: Investigate the properties and importance of water
M	aterials: A penny, an eyedropper or pipette, a cup of water, and paper towels for each team of students.
So ox po	inckground: Imetimes we call water H <sub>2</sub> O. That's because water molecules each have two hydrogen atoms and one ygen atom. While water molecules are neutral as a whole, one end of the water molecule tends to have a sitive charge while the other has a negative charge (polarity). Each end of a water molecule is attracted to e opposite charged end of another water molecule. This is called "hydrogen bonding."
	edict: How many drops of water can you put on the top of a penny before it spills over? More than you ay think!
Ac	tivity:
<ul><li>2.</li><li>3.</li><li>4.</li></ul>	Clean a penny using a paper towel. Do not use soap! Place the penny on a flat surface. Using the eye dropper, drop water one drop at a time onto the penny. Count the number of drops the penny will hold before the water spills over. Try it againsee how many drops it will hold the second time.
<u>Ot</u>	oservations:
2.	Do the water drops stay together or apart?
3.	What property of water causes this?
4.	Is the water flat on top of the penny or rounded up?
5.	What property of water causes this?
Sic	gnificance for Living Things:
6.	Describe an example of why the property of cohesion is important for plants.
_	
7.	Describe an example of how certain insects use the surface tension of water.

#### Answers:

- 2. The water molecules stay together on top of the penny.
- 3. This property is called cohesion
- 4. The water is rounded up on top of the penny.
- 5. This property is called surface tension
- 6. Water moves from the soil, up the tubes inside the roots, through the tubes inside the stem to all the cells in the plant.
- 7. Certain insects called water striders "walk" on water using the thin film created by surface tension.

## Pollination Activity



Use pipe cleaners as bee legs (6) and tape to the bee.



Place powder in the center of the flower to represent "pollen".

Press "bee legs" into pollen then "fly" your bee to another student's "flower" and land on their "flower". This simulates the act of cross-pollination.

## Science Lab/Activity Report Sheet

Name	9	
What	is the date?	What is the month?
Нуро	thesis: What did you do today?	What do you think would happen?
Mater	rials-What supplies did you use?	
Proce	edures-What did you do?	
Obse	rvations-What did you see happen?	
Resul	lts-Illustrate what happened.	
	1	